17330

11819

3 Hours / 100 Marks Seat No.

Instructions :   (1) *All* questions are *compulsory*.

             (2) Answer *each* next main question on a *new* page.

             (3) Illustrate your answers with neat sketches *wherever* necessary.

             (4) Figures to the *right* indicate *full* marks.

             (5) Assume suitable data, if *necessary*.

Marks

1. a) Attempt **any six** :   **12**

     a) Define Data Structure. Enlist any two operations on it.

     b) Define sorting. Write its types.

     c) Write any two applications of stack.

     d) Write any four primitive operations on queue.

     e) Define the terms NULL pointer and next pointer for linked list.

     f) Define binary search tree.

     g) Write any two applications of graph.

     h) Define the term recursion.

   b) Attempt **any two** :   **8**

     a) Define the following terms with respect to tree :

       i) leaf node

       ii) degree of node

       iii) height of tree

       iv) descendant node.

     b) Write a 'program in c' language for selection sort.

     c) Convert the given infix expression into postfix using stack and write down steps of conversion

     $a \uparrow b * c - d + e$.

2. Attempt **any four** :   **16**

   a) Define Algorithm. Describe different approaches for designing an algorithm.

   b) Write difference between stack and queue (any 4 points).

   c) Write an algorithm to POP an element from stack.

P.T.O.

   d) Create a binary search tree for the following data :
      10, 25, 15, 5, 2, 7, 12.

   e) Describe directed and undirected graph with suitable example.

   f) Describe binary search with example.

3. Attempt **any four** :   **16**

   a) Describe the concept of time complexity with example.

   b) Write an algorithm for traversal of graph using DFS (Depth First Search) method.

   c) Describe with example, use of stack in reversing a list.

   d) Explain the concept of circular queue with example.

   e) State and describe three types of linked list with suitable diagram.

   f) Define the term binary tree. Write down preorder, inorder, postorder traversal for following tree.
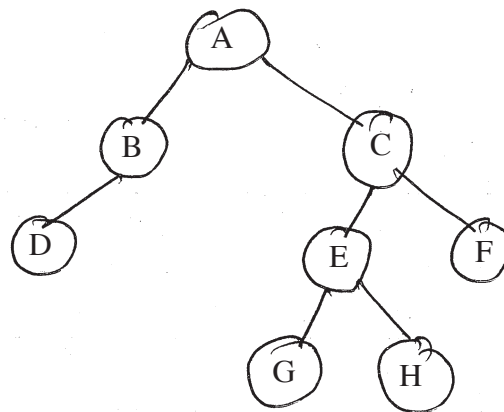
4. Attempt **any four** :   **16**

   a) Consider the given graph. Write the adjacency matrix and adjacency list for it.
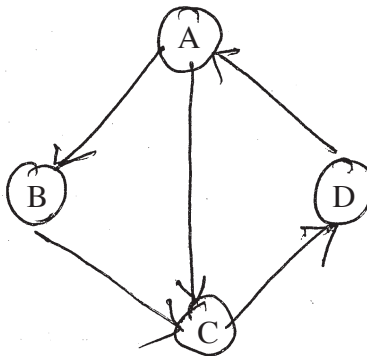
b) Differentiate between general tree and binary tree (any 4 points).

c) Explain the procedure for deleting first node from a singly linked list.

d) Describe priority queue with suitable example.

e) Perform bubble sort on following data to sort all elements in ascending order.

15, 10, 02, 35, 08 (show all steps)

f) Write 'C' program to calculate the factorial of a number using recursion.

5. Attempt **any four** :   **16**

a) Consider the following array :

55 65 25 75 45 85 10

Write stepwise procedure to find 45 using linear search.

b) Define linked list. Write its two advantages and disadvantages.

c) Write an algorithm for inorder traversal of binary tree.

d) Describe Big 'O' notation. Also give example.

e) Define Hash function. Explain any one method of hashing.

f) Describe stack as ADT.

6. Attempt **any four** :   **16**

a) Describe working of Radix sort with example.

b) Explain underflow and overflow of stack with suitable diagram.

c) Write an algorithm for traversing in linked list.

d) Explain Double Ended Queue with suitable diagram.

e) Draw tree structure for following expression :

$(2x + y^2 + z^3) + (3a + 4b + c^2)$.

f) Define the following terms with respect to graph :
   a) Successor
   b) Indegree
   c) Path
   d) Weighted graph.

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